IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

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Applicant	:	Eldridge et al.	
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Docket No.	:	276440-3	

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AMENDMENT

To Whom It May Concern:

In response to the final Office Action of November 18, 2005, the period for response to which has been extended to March 20, 2006 (the first business day following March 18, 2006) by the accompanying Petition For Extension Of Time, and in conjunction with a Request For Continued Examination filed herewith, please amend the above-identified application as follows:

Amendments to the Claims are reflected in the list of claims that begins on page 2 of this paper.

Remarks/Arguments begin on page 14 of this paper.

Amendments to the Claims:

This listing of claims will replace all prior versions, and listings, of claims in the application.

Listing of Claims:

Claims 1 and 2 (Canceled)

Claim 3 (Currently amended): The microelectronic spring structure of Claim 73, wherein ~~an end~~ said tip of said beam has an unloaded height over said electronic component in the range of about 1 to about 5 mils.

Claim 4 (Currently amended) The microelectronic spring structure of Claim 73, wherein ~~an end~~ said tip of said beam has an unloaded height over said electronic component less than about 2 mils.

Claim 5 (Previously presented): The microelectronic spring structure of Claim 73, wherein said beam has a width in the range of about 6 to about 12 mils.

Claim 6 (Previously presented): The microelectronic spring structure of Claim 73, wherein said beam has a width no greater than about 5 mils at said base.

Claim 7 (Previously amended): The microelectronic spring structure of Claim 6, wherein said beam has a width less than about 1 mil.

Claim 8 (Currently amended): The microelectronic spring structure of Claim 73, wherein said length of said beam ~~has a length~~ is in the range of about 1 to about 10 mils.

Claims 9-12 (Canceled)

Claim 13 (Previously presented): The microelectronic spring structure of Claim 73, wherein said microelectronic spring structure has an elastic deflection ratio in a direction perpendicular to and towards said electronic component of at least about 10%.

Claim 14 (Previously presented): The microelectronic spring structure of Claim 73, wherein said microelectronic spring structure has an elastic range in a direction perpendicular to and towards said electronic component within a range of about one to about twenty mils.

Claims 15 and 16 (Canceled)

Claim 17 (Previously presented): The microelectronic spring structure of Claim 73, wherein said microelectronic spring structure has a spring rate at an end thereof in at least one direction within a range of about 30 to about 600 micrograms per micron.

Claim 18 (Canceled)

Claim 19 (Previously presented): The microelectronic spring structure of Claim 71, wherein said beam is contoured in a lengthwise direction.

Claim 20 (Canceled)

Claim 21 (Previously presented): The microelectronic spring structure of Claim 71, wherein said cross-sectional width is generally V-shaped.

Claim 22 (Withdrawn): The microelectronic spring structure of Claim 71, wherein said cross-sectional width is generally U-shaped in cross-section.

Claim 23 (Withdrawn): The microelectronic spring structure of Claim 71, wherein said cross-sectional width is generally S-shaped in a lengthwise direction.

Claim 24 (Withdrawn): The microelectronic spring structure of Claim 71, wherein said beam further comprises corrugations disposed along a lengthwise direction.

Claim 25 (Previously presented): The microelectronic spring structure of Claim 71, wherein said beam, in a lengthwise sectional view, has a stepped portion connected to said base.

Claim 26 (Previously presented): The microelectronic spring structure of Claim 25, wherein said stepped portion of said beam has a step height in the range about 5% to about 20% of an unloaded height of an end of said beam over said electronic component.

Claim 27 (Previously presented): The electronic component of Claim 25, wherein said stepped portion of said beam has a step height about 10% of an unloaded height of an end of said beam over said electronic component.

Claim 28 (Withdrawn): The microelectronic spring structure of Claim 71, wherein said beam further comprises a plurality of lengthwise ribs extending over at least a portion of said beam.

Claim 29 (Withdrawn): The microelectronic spring structure of Claim 71, wherein said beam further comprises a lengthwise rib extending over at least a portion of said beam.

Claim 30 (Withdrawn): The microelectronic spring structure of Claim 29, wherein said beam has a stepped portion connected to said base, and wherein said lengthwise rib extends to said stepped portion.

Claim 31 (Withdrawn): The microelectronic spring structure of Claim 29, wherein said lengthwise rib extends into said base.

Claim 32 (Withdrawn): The microelectronic spring structure of Claim 29, wherein said lengthwise rib comprises a lengthwise channel.

Claim 33 (Withdrawn): The microelectronic spring structure of Claim 29, wherein said lengthwise channel has a regular geometric cross-sectional shape.

Claim 34 (Withdrawn): The microelectronic spring structure of Claim 33, wherein said regular geometric cross-sectional shape further comprises a shape selected from the group consisting of part-rectangular, part-trapezoidal, part-triangular and part-round shapes.

Claim 35 (Withdrawn): The microelectronic spring structure of Claim 29, wherein a cross-sectional dimension of said lengthwise rib differs over the length thereof.

Claim 36 (Withdrawn): The microelectronic spring structure of Claim 29, wherein said rib is comprised of a folded portion of said beam.

Claim 37 (Withdrawn): The microelectronic spring structure of Claim 71, wherein said beam has a plurality of ribs along a lengthwise direction, wherein said plurality of ribs have a height tapering from a first dimension at said base to a second dimension at said tip, wherein said first dimension is greater than said second dimension.

Claim 38 (Previously presented): The microelectronic spring structure of Claim 71, wherein said base and said beam are integrally formed.

Claims 39 and 40 (Canceled)

Claim 41 (Previously presented): The microelectronic spring structure of Claim 71, wherein said beam, viewed in a direction normal to said electronic component, is tapered so as to have a generally triangular shape.

Claim 42 (Withdrawn): The microelectronic spring structure of Claim 71, wherein said beam, viewed in a direction normal to said electronic component, has a generally rectangular shape.

Claim 43 (Withdrawn): The microelectronic spring structure of Claim 71, wherein said beam, viewed in a direction normal to said electronic component, has an offset with respect to a central axis.

Claim 44 (Withdrawn and currently amended): The microelectronic spring structure of Claim 71, wherein said beam, viewed in a direction normal to said electronic component, is contoured so that [[a]] said tip is located at an end of said beam [[that]] and is opposite said base is positioned a distance from said base that is less than an integrated length of said beam between said base and said tip.

Claim 45 (Withdrawn): The microelectronic spring structure of Claim 71, wherein said beam, viewed in a direction normal to said electronic component, is serpentine.

Claim 46 (Withdrawn): The microelectronic spring structure of Claim 71, wherein said beam, viewed in a direction normal to said electronic component, is C-shaped.

Claim 47 (Withdrawn): The microelectronic spring structure of Claim 44, wherein a portion of said beam comprises at least two parallel arms.

Claim 48 (Previously presented): The microelectronic spring structure of Claim 71, wherein said base and said beam are integrally formed and comprise a resilient material.

Claims 49 and 50 (Canceled)

Claim 51 (Currently amended): The microelectronic spring structure of Claim 71, wherein said base and said beam are integrally formed and comprise a layer of an electrically conductive seed material and a layer of ~~electroplated~~ metallic material electroplated onto said seed material, wherein said layer of metallic material is thicker than said layer of seed material.

Claims 52-70 (Canceled)

Claim 71 (Currently amended): A microelectronic spring structure comprising:

a base secured to a terminal of an electronic component, wherein said electronic component comprises a semiconductor die; and

a beam extending from said base and ending in a tip spaced from said electronic component, wherein a shape of a cross-sectional width of said beam perpendicular to a length of said beam from said base to said tip comprises a contour that increases at least one of an area moment of inertia of said beam, a stiffness of said beam, and a spring force of said beam relative to a beam having an equivalent mass per unit length but lacking said contour,

wherein a thickness of said beam is thinner at said tip than at said base.

Claim 72 (Canceled)

Claim 73 (Previously presented): The microelectronic spring structure of Claim 72, wherein said semiconductor die is one of a plurality of semiconductor dice composing an unsingulated semiconductor wafer.

Claim 74 (Currently amended): An electronic component comprising:

a terminal; and

a contact structure comprising:

a base secured to said terminal; and

a beam extending from said base and ending in a tip spaced from said electronic component, a cross-sectional width of said beam ~~contoured in~~ perpendicular to a length of said beam from said base to said tip comprising one of a "V" shape, a "U" shape, and a shape comprising an extension that forms a rib,

wherein a thickness of said beam is thinner at said tip than at said base,

said beam comprises a compound curve along said length from said base to said tip, and

said electronic component is a semiconductor die.

Claim 75 (Canceled)

Claim 76 (Previously presented): The electronic component of Claim 75, wherein said semiconductor die is one of a plurality of semiconductor dice composing an unsingulated semiconductor wafer.

Claim 77 (Previously presented): The electronic component of Claim 74, wherein said beam is contoured along a length thereof.

Claim 78 (Previously presented): The electronic component of Claim 74, wherein said beam has a generally triangular shape.

Claim 79 (Previously presented): The electronic component of Claim 74, wherein said base and said beam are integrally formed.

Claim 80 (Previously presented): The electronic component of Claim 79, wherein said base and said beam comprise a resilient material.

Claim 81 (Currently amended): The electronic component of Claim 79, wherein said base and said beam comprise a layer of conductive seed material and a layer of ~~electroplated~~ metallic material electroplated onto said seed material, wherein said layer of metallic maerial is thicker than said layer of seed material.

Claim 82 (Previously presented): The electronic component of Claim 74 further comprising a plurality of said terminals and a plurality of said contact structures.

Claims 83-104 (Canceled)

Claim 105 (Previously presented): The electronic component of claim 74, wherein said cross-sectional width of said beam is contoured in said "V" shape.

Claim 106 (Withdrawn): The electronic component of claim 74, wherein said cross-sectional width of said beam is contoured in said "U" shape.

Claim 107 (Withdrawn): The electronic component of claim 74, wherein said cross-sectional width of said beam is contoured in said shape comprising an extension that forms a rib.

Claim 108 (Previously presented): The microelectronic spring structure of Claim 71, wherein said contour increases said area moment of inertia of said beam.

Claim 109 (Previously presented): The microelectronic spring structure of Claim 71, wherein said contour increases said stiffness of said beam.

Claim 110 (Previously presented): The microelectronic spring structure of Claim 71, wherein said contour increases said spring force of said beam.

Claim 111 (Previously presented): The microelectronic spring structure of Claim 71, wherein said contour is non-rectangular.

Claim 112 (Previously presented): The microelectronic spring structure of Claim 111, wherein said contour increases a spring force of said beam relative to a beam having an equivalent mass per unit length having a rectangular contour.

Claim 113 (Previously presented): The microelectronic spring structure of Claim 71, wherein said base and said beam are integrally formed one with another and comprise a single structure.

Claim 114 (Currently amended): The microelectronic spring structure of Claim 113, wherein said single structure [[is a]] comprises lithographically ~~formed structure~~ deposited material.

Claim 115 (Currently amended): The microelectronic spring structure of Claim 71, wherein said base and said beam compose a single[[,]] structure ~~formed by an~~ comprising electroplated ~~deposit~~ material.

Claim 116 (Currently amended): An electronic component comprising:

a terminal disposed on said electronic component and providing signal input and/or output to said electronic component; and

an electrically conductive contact structure having two ends, wherein:

a first of said ends comprises a base secured to said terminal,

a beam portion of said contact structure extends away from said electronic component and terminates in ~~said second end~~ a second of said ends, and

a geometric shape of a cross-sectional width of said beam is asymmetrical with respect to an axis about which a mass distribution of said beam at said cross-sectional width is symmetrically distributed,

wherein said cross-sectional width is perpendicular to a length of said beam from said first end to said second end.

Claims 117 and 118 (Canceled)

Claim 119 (Previously presented): The electronic component of Claim 116, wherein said shape is "V" shaped.

Claim 120 (Withdrawn): The electronic component of Claim 116, wherein said shape is "U" shaped.

Claim 121 (Withdrawn): The electronic component of Claim 116, wherein said shape comprises an extended portion forming a rib.

Claim 122 (Previously presented): The electronic component of Claim 116, wherein said shape comprises an arc.

Claim 123 (Withdrawn): The electronic component of Claim 116, wherein said shape comprises two convex arcs joined one to another.

Claim 124 (Previously presented): The electronic component of Claim 116, wherein said contact structure comprises an integrally formed, single structure.

Claim 125 (Currently amended): The electronic component of Claim 124, wherein said contact structure [[is]] comprises lithographically ~~formed~~ deposited material.

Claim 126 (Previously presented): The electronic component of Claim 116, wherein said contact structure comprises electroplated material.

Claim 127 (Previously presented): The electronic component of Claim 116, wherein said shape increases at least one of an area moment of inertia of said beam, a stiffness of said beam, and a spring force of said beam relative to a beam having an equivalent mass per unit length but lacking said shape.

Claim 128 (Previously presented): The electronic component of Claim 127, wherein said shape increases said area moment of inertia of said beam.

Claim 129 (Previously presented): The electronic component of Claim 127, wherein said shape increases said stiffness of said beam.

Claim 130 (Previously presented): The electronic component of Claim 127, wherein said shape increases said spring force of said beam.

Claim 131 (Previously presented): The electronic component of claim 116, wherein said electronic component comprises a semiconductor die.

Claim 132 (Previously presented): The electronic component of claim 131, wherein said die is one of a plurality of dies of an unsingulated semiconductor wafer.

Claim 133 (New): The microelectronic spring structure of claim 71, wherein said thickness of said beam tapers continuously from said base to said tip.

Claim 134 (New): The microelectronic spring structure of claim 71, wherein said beam comprises a compound curve along said length from said base to said tip.

Claim 135 (New): The microelectronic spring structure of claim 71, wherein continuously along said length of said beam from said base to said tip a cross-sectional width of said beam comprises a contour that increases at least one of an area moment of inertia of said beam, a stiffness of said beam, and a spring force of said beam relative to a beam having an equivalent mass per unit length but lacking said contour.

Claim 136 (New): The microelectronic spring structure of claim 71, wherein said thickness of said beam is generally along a direction in which said beam deflects in response to a force applied to said tip.

Claim 137 (New): The electronic component of claim 74, wherein said thickness of said beam tapers continuously from said base to said tip.

Claim 138 (New): The electronic component of claim 74, wherein said beam comprises a compound curve along said length from said base to said tip.

Claim 139 (New): The electronic component of claim 74, wherein continuously along said length of said beam from said base to said tip a cross-sectional width of said beam comprises one of a "V" shape, a "U" shape, and a shape comprising an extension that forms a rib.

Claim 140 (New): The electronic component of claim 74, wherein said thickness of said beam is generally along a direction in which said beam deflects in response to a force applied to said tip.

Claim 141 (New): The electronic component of claim 116, wherein said second end comprises a contact tip configured to contact another electronic component.

Claim 142 (New): The electronic component of claim 141, wherein:

said beam is configured to deflect from an initial position in response to a force applied to said tip, wherein said beam is in said initial position prior to said force being applied to said tip, and

said geometric shape of a cross-sectional width of said beam is asymmetrical with respect to an axis about which a mass distribution of said beam at said cross-sectional width is symmetrically distributed while said beam is in said initial position.

Claim 143 (New): The electronic component of claim 141, wherein a thickness of said beam is thinner at said tip than at said base.

Claim 144 (New): The electronic component of claim 143, wherein said thickness of said beam tapers continuously from said base to said tip.

Claim 145 (New): The electronic component of claim 141, wherein said thickness of said beam is generally along a direction in which said beam deflects in response to a force applied to said tip.

Claim 146 (New): The electronic component of claim 116, wherein said beam comprises a compound curve along said length from said base to said tip.

Claim 147 (New): The electronic component of claim 116, wherein continuously along said length of said beam from said base to said tip a geometric shape of a cross-sectional width of said beam is asymmetrical with respect to an axis about which a mass distribution of said beam at said cross-sectional width is symmetrically distributed.

REMARKS/ARGUMENTS

I. Introduction:

Claims 3, 4, 8, 19, 23, 44, 51, 71, 74, 81, 114-116, and 125 are amended, and claims 133-147 are newly added. Claims 1, 2, 9-12, 15, 16, 18, 20, 39, 40, 49, 50, 52-70, 72, 75, 83-104, 117, and 118 are canceled. Claims 3-8, 13, 14, 17, 19, 21-38, 41-48, 51, 71, 73-82, 105-116, and 119-147 are pending in the application, although claims 22-24, 28-37, 42-47, 106, 107, 120, 121, and 123 are withdrawn. Applicants respectfully request reexamination and reconsideration of the application.

II. Restriction

Applicants acknowledge the Restriction and the constructive election of claims 1-113, 116-124, and 127-132. Nevertheless, Applicants respectfully traverse the Restriction on the grounds that claims 114, 115, 125, and 126 are not drawn to methods of forming. Claims 114 and 115 are expressly drawn to a "microelectronic spring structure"—not to a method of making the spring structure. Similarly, claims 125 and 126 are expressly drawn to an "electronic component"—not to a method of making the electronic component. Moreover, none of claims 114, 115, 125, and 126 recites steps in a method. Rather, those claims describe structural features (e.g., "said base and said beam compose a single structure comprising electroplated material"). Therefore, the Restriction should be withdrawn.

III. Rejections Of Claims:

Claims 19, 25, 38, 41, 48, 71-73, 108-113, 116-118, 124, and 127-130 were rejected under 35 USC 102(b) as anticipated by U.S. Patent No. 5,152,695 to Grabbe et al. ("Grabbe"); claims 74, 77-80, 82, and 105 were rejected under 35 USC 102(b) as anticipated by U.S. Patent No. 4,017,143 to Knowles ("Knowles"); claims 116, 131, and 132 were rejected under 35 USC 102(b) as anticipated by U.S. Patent No. 5,772,451 to Dozier, II et al. ("Dozier"); and claims 21, 71, 74, 77-80, and 82 were rejected under 35 USC 102(e) as anticipated by U.S. Patent No. 6,113,440 to Fijten et al. ("Fijten"). In addition, claims 3-8, 13, 14, 17, 26, 51, 71-76, 81, 119, and 122 were rejected under 103(a) as obvious in view of one or a combination of two or more of Grabbe, Dozier, Fijten, U.S. Patent No. 5,613,861 to Smith et al. ("Smith"), and U.S. Patent No. 6,309,262 to Morris ("Morris"). Applicants respectfully traverse these rejections.

A. Independent Claim 71

Independent claim 71 was rejected as anticipated by Grabbe and Fijten and obvious in view of Dozier and Morris. Applicants respectfully traverse these rejections.

Claim 71 recites that a thickness of the beam is thinner at its tip than at its base. As can be seen in Figures 11, 12, 14, 15, 17, and 18 of Grabbe, the thickness of Grabbe's spring arms (which the PTO equated with the beams of claim 71) is not thinner at the tip than at the base. In fact, as shown in Figure 2, Grabbe's entire contact structure 10—including the spring arms 22—are fashioned from a single sheet of metal 30, and there is no reason to suppose that the single sheet of metal 30 is anything other than uniform in thickness. (See Grabbe Figure 2.) Thus, there is no reason to suppose that the spring arms 22 of each contact structure 10 are not uniform in thickness. Moreover, Grabbe does not suggest making the spring arms 22 thinner at the tips than at the bases. For this reason alone, claim 71 is patentable over Grabbe.

Grabbe also fails to teach or suggest the recitation in claim 71 that "a shape of a cross-sectional width of said beam perpendicular to a length of said beam from said base to said tip comprises a contour that increases at least one of an area moment of inertia of said beam, a stiffness of said beam, and a spring force of said beam relative to a beam having an equivalent mass per unit length but lacking said contour." As should be apparent from Figures 2, 3, 6, and 7 of Grabbe, the spring arms 22 have a generally rectangular shaped cross-section taken perpendicular to a length of the spring arms 22 from the base 20 to the contact section 24. In fact, as discussed above, the entire connector 10, including the spring arms 22, are cut from what appears to be a uniform sheet of material 30 having a uniform thickness (see Grabbe, Figure 2), which means that the cross-section of the springs arms 22 taken perpendicular along a length of the spring arms 22 from the base 22 to the contact section 24 is necessarily generally rectangular and of uniform thickness. No matter how oriented (e.g., rotated) a cross-section that is generally rectangular and of uniform thickness does not have "a contour that increases at least one of an area moment of inertia of said beam, a stiffness of said beam, and a spring force of said beam relative to a beam having an equivalent mass per unit length but lacking said contour," as would be required to meet the recitations of claim 71. For this additional reason alone, claim 71 is patentable over Grabbe.

Should, however, the Examiner maintain the rejection of claim 71 as anticipated by Grabbe, Applicants respectfully request that the Examiner identify the contour of the cross-section of the spring arms 22 of Grabbe that "increases at least one of an area moment of inertia of said beam, a stiffness of said beam, and a spring force of said beam relative to a beam having an equivalent mass per unit length but lacking said contour."

With regard to Fijten, that reference fails to teach or suggestion a microelectronic spring structure that is secured to a semiconductor die. Fijten's relatively large and bulky contact 5 is used in a battery recharger. (Fijten col. 2, lines 61-63.) Nothing in Fijten suggests using bulky contact 5 on a tiny semiconductor die, and indeed, it would be impossible to do so. Claim 71 is therefore patentable over Fijten.

With regard to the combination of Dozier and Morris, those references fail to render claim 71 obvious because (1) there is no motivation to combine the references and, (2) even if combined, the combination would not meet the recitation that a beam have a greater thickness at the base than at the tip.

First, Morris cannot be combined with Dozier because no teaching in the prior art suggests or motivates such a combination. Morris teaches providing a curved shape imparted to its contact areas 502 configured to contact a pad of a daughter card "to minimize the contact area and produce high contact pressure." (Morris col. 4, lines 10 and 11.) Morris' teachings are applicable only to the area 502 of the contact structure that actually makes physical contact with another electronic device (in Morris, a daughter card). Thus, at best, Morris suggests rounding the tips 320b of Dozier's spring structures 320 to reduce the area of the tips 320b that makes physical contact with pads 308 of LGA package 304 and to increase the pressure of the tips 320b against the pads 308.

Morris' teachings have nothing to do with shaping Morris' main beam 402 to alter any characteristics—such as area moment of inertia, stiffness, or spring force—of the beam 402. Indeed, Morris' teachings regarding rounding the contact areas 502 make use of the well known scientific principle that the smaller a contact area, the greater the pressure exerted by the contact area. Morris' teachings do not make use of any scientific principle related to area moment of inertia, stiffness, or spring force of the main beam 402. Morris thus includes no teaching that would lead a person of ordinary skill in the field to make any modifications to Dozier's spring structure 320 that would affect the area moment of inertia, stiffness, or spring force of the beam portion—located between the base 320a and the tip 320b—of Dozier's spring structure 320.

For all of the foregoing reasons, no teaching in Morris would lead a person of ordinary skill in the field to modify the beams of Dozier's spring structures 320 to affect the area moment of inertia, stiffness, or spring force of the beams of Dozier's spring structures 320. For this reason alone, claim 71 is patentable over Dozier and Morris.

Second, claim 71 recites that "a thickness of said beam is thinner at said tip than at said base." As can be seen in the side views of main beam 402 in Figures 4 and 5 of Morris, Morris's main beam 402 has a uniform thickness over its entire length. Moreover, although Dozier's claims are sufficiently broad to cover beams of varying thicknesses, the beam of the spring structures 320 are depicted in Figure 3 of Dozier with a uniform thickness. Thus, even if Dozier and Morris were to be combined (which Applicants continue to assert is improper for the reasons discussed above), the combination would not meet all of the recitations of claim 71. For this reason alone, claim 71 is patentable over Dozier and Morris.

B. Independent Claim 74

Independent claim 74 was rejected as anticipated by Knowles and Fijten and obvious in view of Dozier and Morris. Applicants respectfully traverse these rejections.

Claim 74 recites that "said beam comprises a compound curve along said length from said base to said tip." As can be seen in Figure 2 of Knowles, the tail section 16 (which was equated with the beam of claim 74) of Knowles' contact 10 is straight and does not have a curve along its length much less a compound curve. Moreover, Knowles does not suggest imparting a compound curve to the tail section 16, nor would there be any reason to do so. Claim 74 is therefore patentable over Knowles.

As discussed above with respect to claim 71, Fijten fails to teach or suggest a contact structure that can be attached to a semiconductor die. Claim 74, which recites that the claimed electronic component is a semiconductor die, is therefore patentable over Fijten.

The rejection of claim 74 in view of Dozier and Morris should be withdrawn for at least two reasons. First, as discussed above with respect to claim 71, at best, the prior art suggests making the tips 320b of Dozier's spring contacts 320 curved, like Morris' contact areas 502, to decrease the area of contact between Dozier's tips 320b and the pads 308 of the LGA package 304 and increase the contact pressure of the tips 320b against the pads 308. (See Dozier Figure 3.) Nothing in the prior art, however, would lead a person of ordinary skill in the field to modify the cross-sectional shape of Dozier's beams (between ends 320a and tips 320b), In fact, there is no reason to apply Morris' teachings regarding making contact areas 502 curved to any part of Dozier's spring contact 320 that does not make contact with the pads 308 of the LGA package 304. For this reason alone, claim 74 is patentable over Dozier and Morris.

Moreover, as discussed above with respect to claim 74, even if combined (which Applicants assert is improper as discussed above), the combination of Dozier and Morris does not meet the recitation in claim 74 that "a thickness of said beam is thinner at said tip than at said base." For this additional reason, claim 74 is patentable over Dozier and Morris.

C. Independent Claim 116

Independent claim 116 was rejected as anticipated by Grabbe and Dozier. Applicants respectfully traverse these rejections.

Claim 116 states that "a geometric shape of a cross-sectional width of said beam is asymmetrical with respect to an axis about which a mass distribution of said beam at said cross-sectional width is symmetrically distributed," and claim 116 further states that "said cross-sectional width is perpendicular to a length of said beam from [a] first end to a second of said ends." Neither Grabbe nor Dozier teaches or suggests the foregoing geometric shape feature of claim 116.

As discussed above, the shape of a cross-sectional width taken perpendicular to a length of Grabbe's spring arms 22 from the base 20 to the contact section 24 is generally rectangular. In fact, because Grabbe's entire connector 10, including the spring arms 22, are cut from what appears to be a uniform sheet of material 30 having a uniform thickness (Grabbe Figure 2), spring arms 22 can only have a rectangular cross-section. Because of the rectangular shape, the shape of the cross-sectional width of Grabbe's arms 22 will always be symmetrical with respect to an axis about which the mass is symmetrically distributed no matter how the arms 22 are oriented. Therefore, claim 116 is patentable over Grabbe.

Although the claims of Dozier are sufficiently broad to cover spring structures with beams whose cross-sectional widths are asymmetrical with respect to an axis about which a mass of the beam is distributed symmetrically, the exemplary beam of the spring structure 320 shown is depicted in Figure 3 as having a uniform cross-sectional width from the base 320a to the tip 320b. Because the cross-sectional width is uniform, the cross-sectional shape will always be symmetrical with respect to an axis about which the mass is symmetrically distributed no matter how oriented. Therefore, claim 116 is also patentable over Dozier.

D. Dependent Claims

Claims 3-8, 13, 14, 17, 19, 21-38, 41-48, 51, 73, 76-82, 105-115, and 119-147 depend from one of claim 71, claim 74, or claim 116 and are therefore patentable over the prior art of record due to their dependency on now presumably allowable claims 71, 74, and 116. Moreover, claims 3-8, 13, 14, 17, 19, 21-38, 41-48, 51, 73, 76-82, 105-115, and 119-147 recite additional features that are not taught or suggested by the prior art of record, whether taken individually or in combination.

Foe example, claim 51 recites that the base and beam are integrally formed and comprise a seed material and "a layer of metallic material electroplated onto the seed material." Claim 51 further states that "said layer of metallic material is thicker than said seed material." Claim 81 recites a similar structure. An advantage of such a structure is that an electroplating process can be used to make such a structure, and as is known, electroplating processes are efficient and economical. As can be seen in Figure 13 of Smith (which the PTO relied on to rejection claims 51 and 81), the Smith's electroplated gold layer 19 is thinner than the spring contact 15, which therefore does not meet the recitation in claims 51 and 81 that the electroplated material is thicker than the seed layer. Claims 51 and 81 are therefore patentable over the prior art of record.

Claims 114 and 115 describe the base and beam of the recited microelectronic spring as an integrally formed "single structure." Further describing the structure of the microelectronic spring, claim 114 states that the single structure comprises "lithographically deposited material," and claim 115 states that the single structure comprises "electroplated material." Claims 125 and 126 include similar recitations regarding the structural configuration of the contact structure recited in those claims. Much of the prior art of record does not teach or suggest the foregoing structural features and cannot therefore be applied to claims 114, 115, 125, and 126. Claims 114, 115, 125, and 126 are therefore patentable over the prior art of record.

New claims 133-147 recite several features not taught or suggested by the prior art of record.

IV. Conclusion:

In view of the foregoing, Applicants submit that all of the claims are allowable and the application is in condition for allowance. If the Examiner believes that a discussion with Applicants' attorney would be helpful, the Examiner is invited to contact the undersigned at (801) 323-5934.

Respectfully submitted,

Date: March 20, 2006

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